FREE-FLOWING SULFUR TRANSPORT, STORAGE AND USE TO PRODUCE ENERGY, FERTILIZER OR HYDROGEN WITHOUT CARBON DIOXIDE

ABSTRACT OF THE DISCLOSURE

Elemental sulfur is combined with either liquid anhydrous ammonia, liquid sulfur dioxide, or both to form a solution or slurry which is transportable through pipelines or other transport vessels without a risk of clogging due to the environmental temperature drops that these vessels typically encounter. This unusual behavior and the advantages it offers arise from the discovery of unexpected solubility vs. temperature relationships of elemental sulfur in each of these two carriers. Among the advantages are significant improvements in the economics of many industrial chemical processes that involve the presence of sulfur either in elemental or chemically combined form, including natural gas or tar sands production and processing, hydrogen sulfide abatement, hydrogen production without carbon dioxide emissions, and sulfur extraction from ores, subterranean deposits, depositories, or fouled impaired industrial facilities. Large-scale ramifications for energy and fertilizer mineral resource utilization, greenhouse gas abatement, hydrogen economy, and nitrogen fertilizer production are taught.